

Chez Pierre

Presents ...

Wednesday, February 22, 2012

11:00am

MIT Room 4-331



SPECIAL CHEZ PIERRE SEMINAR

**Eva-Maria Schoetz
Princeton University**

"Body sculpting: Collective phenomena in development, regeneration, and asexual reproduction"

Embryogenesis and regeneration are among the most striking and beautiful phenomena in nature. For a physicist, this brings together many major themes—pattern formation, information processing, the mechanics of complex fluid-like materials—that are essential for our understanding of life more broadly. Connecting macroscopic observables which we can quantify to their microscopic origins is one of the major challenges toward an understanding of these complex processes. In my talk I will give two examples that try to make this connection.

First, I will discuss how tissue surface tension is connected to the mechanical properties of the constituent cells, such as cortical tension and adhesion. I will directly compare theoretical predictions with experimental data using primarily zebrafish embryonic tissues as the experimental system.

In the second part of my talk, I'll switch gears to discuss asexual reproduction in planarians. Asexual reproduction and the ability to regenerate are intrinsically connected, but despite this important link, little is known about asexual reproduction in planarians due to experimental challenges. I will discuss our current understanding of the asexual population dynamics based on a large-scale experiment in which we have been tracking >10,000 divisions over the course of ~3 years and up to 55 generations using a custom-built Scan-Add-Print database system. Statistical analysis of the reproduction dynamics reveals a reproductive memory whose molecular basis we have now begun to elucidate.